NATURAL RESOURCES CONSERVATION SERVICE

CONSERVATION PRACTICE STANDARD

Land Reconstruction of Brine Damaged Areas

(Acre)

Code 773

DEFINITION

Stabilizing land affected by oil brine to establish a protective cover for the planned land use.

PURPOSES

To establish vegetative cover, reduce erosion, and prevent off-site damages.

CONDITIONS WHERE PRACTICE APPLIES

This practice applies to land that has been adversely affected by oil brine contamination and is not regulated under Indiana Code 14-37. Fresh or current spills are regulated under IC 14-37. This practice does not apply to oil wastes.

CRITERIA

1. Compliance with federal, state and local regulations is the responsibility of the land user and operator. All required permits shall be obtained prior to the start of construction activities.

2. Grading and shaping operations shall be planned to permit the use of conventional tillage equipment and to provide positive drainage.

3. Grading and shaping shall leave the soil material suitable for seedbed preparation. When topsoil is needed to insure satisfactory plant establishment, a minimum of 6 inches shall be applied.

4. Field Office Technical Guide conservation practices, where applicable, shall be used to prevent erosion and off-site damage. The application of such practices shall not permit off-site movement of contaminants. For example, adding a water and sediment control basin above a brine-damaged site to reduce erosion would be acceptable if non-perforated tubing was installed through the brine contaminated area.

5. Vegetative cover shall be established on all sites where soil salinity is less than or equal to 18 mmhos/cm. Soil salinity shall be based on soil tests from an approved lab.

Vegetative cover refers to crops and forage, as well as, permanent vegetative cover. Table 1 provides guidance on plant response to soil salinity and information on salinity tolerance of common crops and forages grown in Indiana.

If the site will be established to permanent vegetative cover, seeding mixtures from Table 2 based on the soil salinity of the site shall be used.

Table 1. General guidelines for plant response to soil salinity.

Soil Salinity (mmhos/cm)	Plant Response
0 to 2	mostly negligible
2 to 4	growth of sensitive plants may be restricted
4 to 8	growth of many plants is restricted
8 to 16	only tolerant plants grow satisfactorily
above 16	only a few, very tolerant plants grow satisfactorily

Salinity tolerance of common crops grown in Indiana:

Crop	Yield Loss			
	<5%	10%	25%	50%
	mmhos/cm			
Barley	8.0	9.6	13.0	17.0
Beans	1.0	1.5	2.3	3.6
Canola	2.5	3.9	6.0	9.5
Corn (grain)	2.7	3.7	6.0	7.0
Oats (grain)	5.2	6.7	9.0	12.8
Rye (grain)	5.9	7.7	12.1	16.5
Sorghum	4.0	5.1	7.1	10.0
Sunflower	2.3	3.2	4.7	6.3
Triticale (grain)	6.1	8.1	12.0	14.2
Wheat	4.7	7.0	9.5	13.0

Salinity tolerance of common forages grown in Indiana:

Crop	Yield Loss			
	<5%	10%	25%	50%
	mmhos/cm			
Alfalfa	2.0	3.4	5.4	8.8
Barley (forage)	5.3	7.4	9.5	13.0
Birdsfoot Trefoil	4.0	6.0	7.5	10.0
Brome, Smooth	2.5	3.1	4.0	5.0
Clovers (red, alsike, ladino)	1.3	2.3	3.6	5.7
Corn (silage)	1.8	2.7	6.8	8.6
Oats (forage)	2.6	3.2	4.1	6.8
Orchard Grass	1.5	3.1	5.5	9.6
Perennial Ryegrass	5.6	6.9	8.9	12.0
Rye (forage)	2.5	3.5	5.1	7.2
Sweet Clover	4.0	6.0	7.5	10.0
Sudangrass	2.8	5.1	8.6	14.0
Tall Fescue	3.9	5.8	8.6	14.0
Timothy	2.0	2.7	3.8	5.0
Triticale (forage)	6.1	8.1	10.4	13.6
Tall Wheatgrass	7.5	9.9	13.0	19.0

Table 2. Seeding Mixtures for Saline Areas

Moderate Tolerance 3 to 6 mmhos/cm		**Good Tolerance 6 to 12 mmhos/cm**		**Very Good Tolerance 12 to 18 mmhos/cm**	
Seeding Mixture [1/]	(lbs/ac)	Seeding Mixture [2/]	(lbs/ac)	Seeding Mixture [2/]	(lbs/ac)
1. Switchgrass	5	1. Tall Fescue	18	Tall Wheatgrass [3/]	32
2. Orchard Grass	8	2. Tall Wheatgrass [3/]	24		
		Canada Wildrye	8		
3. Switchgrass	4				
Canada Wildrye	6				
4. Big Bluestem	4				
Indiangrass	3				
Switchgrass	1				
Sideoats Grama	2				
For wetter sites					
5. Switchgrass	4				
Fox Sedge	1/2				

1/ One of the following forbs/legumes could be added to the seeding mixes:

Sweetclover	3 lbs/ac
Alfalfa	5 lbs/ac
Birdsfoot Trefoil	5 lbs/ac
Sawtooth Sunflower	4 oz/ac

2/ 5 lbs/ac of Birdsfoot Trefoil could be added to the seeding mixes.

3/ Varieties Jose or Alkar

6. On sites where the soil salinity exceeds 18 mmhos/cm, a detailed site investigation shall be conducted to determine the extent of the problem. Appropriate treatment alternatives shall be chosen from the following:

a. **Amendments.** Where material removal is not technically or economically feasible, topdress the site with a minimum of 6 inches of organic matter and 3 tons per acre of dolomite lime. The organic material and lime shall be incorporated into the soil. Examples of organic matter include manure, hay, straw, other cut vegetation, leaves, and wood chips.

b. **Removal of brine contaminated soils.** When removal is selected, topsoil or other suitable material shall then be backfilled into the area and vegetative cover established. Prior to removal, the landuser shall acquire all necessary permits for disposal of the contaminated soils.

c. **Creation of permanent water cover.** Permanent water cover shall be created with a dike or dam. Discharge from the site shall meet state water quality requirements. The landuser will acquire all appropriate discharge permits from the state. Impoundment structures shall meet NRCS field office technical guide standards.

d. **Installation of subsurface drains.** Subsurface collection systems installed to remove saturation and to convey excess salts from the site shall be outletted to an approved collection site, such as an injection well. These systems shall require approval of the Indiana Department of Environmental Management and the

Indiana Department of Natural Resources. An NPDES permit may be required.

CONSIDERATIONS

Where the area is to be grazed after establishment with an adjoining unit, select a grass or grasses with the same as or approximately the same palatability and seasons of use as those already present on the adjoining unit. Graze according to an approved management plan.

If feasible, reconstructed areas should be made compatible and complimentary to adjacent areas as to land use and vegetation.

The contaminated soil removed from the site may be suitable, if permitted, for daily cover in an approved sanitary landfill.

All activities should be planned to effectively stabilize the area with permanent, protective, and when technically and economically feasible, productive cover as quickly as possible.

The use of geophysical instruments that measure soil conductivity, such as an electromagnetic induction meter, should be considered for preliminary site investigations to help map areas of high conductivity and to identify areas for soil sampling.

PLANS AND SPECIFICATIONS

Plans and specifications for applying this practice shall be prepared for each site, using approved specification sheets, job sheets, narrative statements in the conservation plan, or other acceptable documentation. These plans shall contain all specifications for seed, seeding dates, site preparation, and all needed associated practices.

OPERATION AND MAINTENANCE

Frequent inspections should be made to evaluate stand development during establishment and at least annually for maintenance. Replant if stand is not adequate for erosion control.

Maintain adequate vegetative cover to stabilize the site and protect it from soil erosion and prevent off-site sedimentation. If reseeding is required top dress sites with 3 inches of organic matter and apply fertilizer at a rate of 60 lbs/acre each of N, P_2O_5, and K_2O or as recommended by soil test.

Maintenance fertilization and liming should be planned. Base all fertilization and lime recommendations on soil tests and at a yield goal comparable to adjoining areas or to a realistic yield of 2 tons per acre for forages.

REFERENCES

National Range and Pasture Handbook, USDA Natural Resources Conservation Service, September 1997.

Salinity and Plant Tolerance, Utah State University Extension, July 1997.